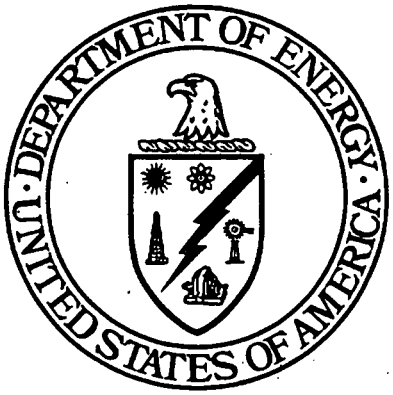
2928

PROJECT SPECIFIC PLAN
FOR AREA 9, PHASE I
PREDESIGN INVESTIATION SAMPLING

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT
FERNALD, OHIO



APRIL 20, 2000

U.S. DEPARTMENT OF ENERGY
FERNALD AREA OFFICE

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APPROVAL:

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Tom Buhrlage, Environmental Monitoring Soil and Water Projects	4-20-00 Date
Frank Thompson, Quality Assurance Soil and Water Projects	4-20-00 Date

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ACRONYMS AND ABBREVIATIONS

A1PI	Area 1, Phase I
A9PI	Area 9, Phase I
A9PII	Area 9, Phase II
ASL	Analytical Support Level
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
COC	constituent of concern
DOE	Department of Energy
DQO	Data Quality Objectives
FACTS	Fernald Analytical Customer Tracking System
FAL	Field Activity Log
FEMP	Fernald Environmental Management Project
FRL	final remediation level
GPS	Global Positioning System
LAN	Local Area Network
mg/kg	milligrams per kilogram
ml	milliliter
pCi/g	picoCuries per gram
PSP	Project Specific Plan
QA/QC	Quality Assurance/Quality Control
RWP	Radiological Work Permit
SCQ	Sitewide CERCLA Quality Assurance Project Plan
SED	Sitewide Environmental Database
SEP	Sitewide Excavation Plan
SPL	Sample Processing Laboratory
TAL	Target Analyte List
V/FCN	Variance/Field Change Notice
WAO	Waste Acceptance Organization

1.0 INTRODUCTION

1.1 BACKGROUND

Area 9, Phase I (A9PI) is the off-property land adjacent to Area 1, Phase I (A1PI). During the precertification process, borings were conducted to evaluate how plowing has affected contamination distribution at depth, and to compare constituent of concern (COC) concentrations in soil against the more conservative off-property final remediation levels (FRLs). As discussed in the Predesign Work Plan for A9PI, these samples indicated above-FRL concentrations of arsenic throughout the plowed zone, and a localized area of above-FRL beryllium. This information led to the development of this project specific plan (PSP) to collect predesign investigation samples and bound this contamination for remedial excavation. This sampling effort will likely require a phased approach, as discussed in the Predesign Work Plan for A9PI.

1.2 PURPOSE

The purpose of this predesign investigation is to gather more information on COC distribution throughout A9PI soil at depth. This includes the following:

- Bound the above-FRL beryllium concentrations east of the Fernald Environmental Management Project (FEMP) property line
- Bound the extent of above-FRL arsenic concentrations east of the FEMP property line
- Evaluate arsenic concentrations in surface soil at various distances downwind from the FEMP.

More discussion on each of these activities is provided in the Predesign Work Plan for A9PI.

1.3 SCOPE

The scope of this PSP includes predesign investigation sample collection in A9PI. This will involve conducting both soil borings and the collection of surface soil samples. This PSP will cover all methods of collecting all predesign investigation samples. All Phase I sampling is documented in this PSP, while additional sampling phases will be documented as a Variance/Field Change Notice (V/FCN) to this PSP. All sampling and analytical activities will be consistent with the Sitewide Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Quality Assurance Project Plan (SCQ), the Sitewide Excavation Plan (SEP) and Data Quality Objectives (DQO) SL-048, Revision 5 (Appendix A).

1.4 KEY PERSONNEL

Key personnel for this A9PI soil sampling project are listed in Table 1-1.

TABLE 1-1
KEY PERSONNEL

Title	Primary	Alternate
DOE Contact	Rob Janke	Kathi Nickel
Area 9 Project Manager	Eric Woods	Jyh-Dong Chiou
Area 9 Characterization Lead	Eric Kroger	Craig Straub
Field Sampling Lead	Tom Buhrlage	Jim Hey
Surveying Lead	Jim Schwing	Jim Capannari
Waste Acceptance Organization (WAO) Contact	Linda Barlow	Sue Lorenz
FEMP Laboratory Contact	Audrey Hannum	Grace Ruesink
Field Validation Contact	Jenine Rogers	Jim Chambers
Data Validation Contact	Jim Chambers	Jim Cross
Data Management Contact	Susan Marsh	Laurie Kahill
Quality Assurance Contact	Reinhard Friske	Frank Thompson
Health and Safety Contact	Lewis Wiedeman	Debbie Grant

2.0 SAMPLING PROGRAM

Note: This PSP supercedes V/FCN 20702-PSP-0002-3 to the A9PI Precertification Physical Sampling PSP. Several changes have been made to sample locations and the collection activities specified in that V/FCN since it was issued. Therefore, this PSP should be used to collect A9PI borings/samples instead of V/FCN 20702-PSP-0002-3.

Before any predesign investigation field activities can be conducted on private property, an access agreement must be obtained from the property owner. This PSP covers Phase I of this predesign investigation, which includes a total of 21 soil borings at 19 locations to a depth of 3 feet, along with four surface samples. Ten of these borings will be conducted to bound beryllium contamination identified along the "notch" along the eastern FEMP boundary (refer to Figure 2-1). For quality control purposes, two extra pushes will be performed at one of these locations to provide a duplicate boring and sufficient soil for split samples. An additional nine borings will be conducted to bound arsenic contamination to the north, east and south of the previously collected precertification borings. One of these locations lies within Area 9, Phase II (A9PII), but on the same landowner's property. The four surface samples will be used to evaluate the trend of arsenic concentrations in a northeasterly (downwind) direction from the FEMP. All boring and surface sample locations are shown on Figure 2-1, and all samples collected under this PSP are listed in Appendix B. All locations will be surveyed and flagged in the field just prior to the beginning of sample collection activities.

2.1 SOIL SAMPLE COLLECTION

2.1.1 General Requirements

Soil samples are to be collected according to SMPL-01, Solids Sampling, or EQT-06, Geoprobe® Model 5400 - Operation and Maintenance. Prior to sample collection, the field sampling technician will remove all surface vegetation (if applicable) within a 6-inch radius of the points to be sampled using a stainless steel trowel or a gloved hand. If surface or subsurface obstacles prevent sample collection at any of the original locations identified in Appendix B, the location may be moved up to 3 feet in radius from the original location. The distance and direction moved will be noted on the Field Activity Log (FAL), and the new coordinates will be entered into the Sitewide Environmental Database (SED) with the associated results. If the new location is greater than 3 feet in radius from the originally planned sample point, the change will be documented on a V/FCN form and the location will be re-surveyed.

Customer sample numbers and Fernald Analytical Customer Tracking System (FACTS) identification numbers will be assigned to all samples collected. Sample labels will be completed with sample collection information. Technicians will complete a FAL, Sample Collection Log, Chain of Custody/ Request for Analysis, and Borehole Abandonment Log (as applicable) in the field.

After processing the samples as specified in Sections 2.1.2 through 2.1.4 of this PSP, all samples will be taken to the clean side of the Sample Processing Laboratory (SPL) where they will be logged into the on-site laboratory for analysis. The split samples (see Section 2.1.3) will be prepared for shipment to an off-site laboratory according to procedure S.P. 766-S-1000, Shipping Samples to Offsite Laboratories, as appropriate. Based on existing radiological data (precertification borings and scanning), no alpha/beta screens will be required.

2.1.2 Soil Borings Collection

Soil cores will be obtained at each of the 21 boring locations using the Geoprobe® Macro-core sampler. Boring numbers 22, 26 and 27 will likely not be accessible to the Geoprobe® due to wooded conditions and, therefore, may have to be collected by hand in a manner consistent with SMPL-01. Regardless of the sample collection method, the core sampler will be driven to an initial depth of 3 feet. Upon removal, the cores will be laid on clean plastic, visually inspected by a field geologist to determine the maximum depth of the plowed zone (where applicable), and recorded in the FAL. The cores collected from unplowed areas will be examined by the field geologist, if possible, for evidence of plowing or other soil disturbance in the past. Each core will then be divided into 6-inch intervals. Finally, each 6-inch interval will be placed into individual 500-ml sample containers and assigned a unique sample identification number (Section 2.4). The laboratory has the responsibility of separating the necessary portions of the soil samples for radiological and metals analysis except for the split samples, as noted below.

2.1.3 Quality Control Boring Collection

For quality control (QC) purposes, two extra cores (a total of three) will be collected in the vicinity of boring location 12 in the same manner as described in Section 2.1.1. One core will be considered a duplicate, and will be processed in the same manner as described in Section 2.1.1. The samples from the duplicate will be submitted to the on-site laboratory. The other two cores from location 12 will be collected in the same manner. However, after dividing them into the six sample increments, each set of

increments (e.g., both 0 to 6-inch increments, both 6 to 12-inch increments, etc.) will be homogenized and separated into two sample containers, as specified in SMPL-21, Collection of Field Quality Control Samples. One set of samples will be considered "normal," while the other set of samples will be considered "split." Note that the sampling team has the responsibility of separating the split samples into two separate containers – one for radiological analyses (at least 250g), the other for metals analyses (at least 25g). The split samples will be analyzed at an off-site laboratory. All samples will be analyzed to Analytical Support Level (ASL) B. The intended analyses for each sample are provided in the Target Analyte Lists (TALs) in Appendix C.

2.1.4 Surface Sample Collection

Surface samples will be collected at the four locations (S1, S2, S3 and S4) using a 3-inch plastic or stainless steel core liner with plastic end-caps. At the discretion of the field sampling lead, another sample collection method may be used per SMPL-01. All samples will be collected to a depth of 6 inches. Upon removal, the core liner will be capped and labeled with the appropriate sample ID number. The surface samples can be batched, separately or with the boring samples, and will be analyzed for TAL B.

2.2 EQUIPMENT DECONTAMINATION

Decontamination is performed to protect worker health and safety and to prevent the introduction of contaminants from sampling equipment to subsequent soil samples. Field technicians will ensure that sampling equipment has been decontaminated before transporting to the sampling location. Equipment that comes into contact with the sample will be decontaminated at Level II in the field between sample collection intervals, and again after the sampling performed under this PSP is completed (Section K.11 of the SCQ). Clean disposable wipes may be used instead of air drying the equipment. Decontamination of the sample liners (plastic core tubes) is not necessary if the liners are maintained in the manufacturer's packaging (or equivalent) to prevent contamination. Other sampling tools that do not come into contact with sample media (i.e., Macro-core sampler body, etc.) will be wiped down using clean disposable towels until visibly clean.

2.3 BOREHOLE ABANDONMENT

Each borehole will be back-filled with unused portion of the soil core and/or surrounding soil, as determined by the field sampling lead.

2.4 SAMPLE IDENTIFICATION

Each sample will be assigned a unique sample identification number, as follows:

A9PI-PDI-LocationID-DepthRM-QC, where:

A9PI = Sample collected from A9PI, note a numeric "1" is used in place of the roman numeral "I" for data management purposes
PDI = Predesign Investigation sample
Location ID = Boring number (10 through 28) or surface sample number (S1 to S4)
Depth = The 0 to 6-inch sample = "1", the 6 to 12-inch sample = "2", and so on
Suite = "RM" designates that the sample will be submitted for both radiological and metals analysis (samples will be submitted to the lab and a separate aliquot will be separated for metals analysis). "R" indicates radiological analysis only; "M" indicates metals anlaysis only.
QC = Quality control sample. "D" indicates a duplicate sample, "S" indicates a split sample. An "X" followed by a sequential number indicates a rinsate sample (e.g., A9PI-PDI-*boring-depth*-X1).

Therefore, the 18 to 24-inch soil sample from boring 14 would be identified as A9PI-PDI-14-4RM. The 6 to 12-inch split sample from boring 12 would be identified as A9PI-PDI-12-2RM-S.

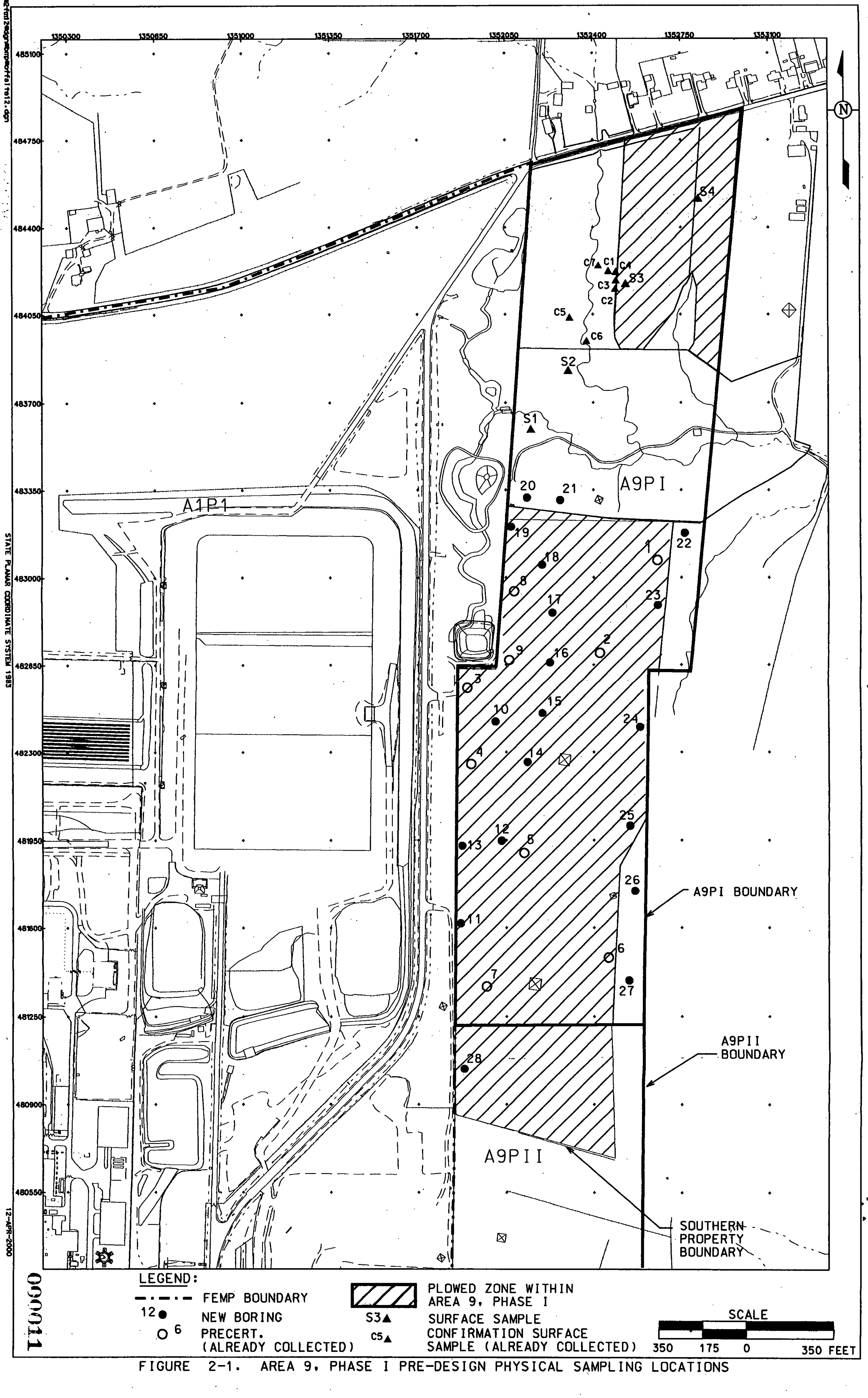

FIGURE 2-1. AREA 9, PHASE I PRE-DESIGN PHYSICAL SAMPLING LOCATIONS

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3.0 SAMPLE ANALYSIS

The necessary volume of all samples collected will be prepared for analysis per project requirements, as appropriate. The radiological COCs will be analyzed by gamma spectrometry, and the metals will be analyzed by a method approved in the SEP. The selected analytical method must be sufficient to resolve all target analytes at concentrations well below their respective off-property FRLs and per ASL B analysis. Sampling and analytical requirements are listed in Table 3-1. The TALs are included as Appendix C.

TABLE 3-1
SAMPLING AND ANALYTICAL REQUIREMENTS

Target Analytes	Sample Matrix	Sample Volume	Lab	ASL	Preservation	Holding Time	Container[a]
Primary Radiological (Total Uranium, Radium-226, Radium-228, Thorium-228, Thorium-232)	Solid	250 grams	On-site or Off-site	B	None	12 months	500 ml Glass or Plastic
Metals (Arsenic, Beryllium, Lead, Manganese)	Solid	25 grams	On-site or Off-site	B	Cool to 4°C	6 months	50 ml Glass or Plastic
All Above (Radiological and Metals)	Liquid (Rinsate)	8 Liters	On-site or Off-site	B	HNO_3 to pH<2; Cool to 4°C	6 months	(2) 4-liters polyethylene

[a] Split samples must have portions for radiological analysis (250g) and metals analysis (25g) separated into individual containers. All other samples can have both portions in the same container (300 g).

4.0 QUALITY ASSURANCE/QUALITY CONTROL REQUIREMENTS

4.1 QUALITY CONTROL SAMPLES AND DATA VALIDATION

The project requirements (which at least meet requirements of DQO SL-048, Revision 5) for field quality control, analytical and data validation requirements are as follows:

- Duplicate and split samples will be collected at one location (boring 12), as described in Section 2.1.3
- Two rinsate samples will be collected for the project, one at the beginning and one at the end of sample collection activities. The rinsates will be analyzed for TAL A9PI-PDI-D (see Appendix C)
- All field data will be validated. A minimum 10 percent of the laboratory data will be validated to ASL B. In this case, the first laboratory release will provide the necessary data for this validation.

4.2 PROJECT REQUIREMENTS FOR SURVEILLANCES

Project management has ultimate responsibility for the quality of the work processes and the results of the sampling activities under this PSP. The FEMP Quality Assurance (QA) organization may conduct independent assessments of work processes and operations. These assessments will evaluate technical and procedural requirements of this PSP and the SCQ. Independent assessments will be performed during implementation of this PSP and will involve monitoring/observing on-going project activity and work areas to verify conformance to specified requirements. Surveillances will be planned and documented according to Section 12.3 of the SCQ.

4.3 FIELD CHANGES TO THE FIELD IMPLEMENTATION PLAN

Additional phases of A9PI predesign investigation samples or any other changes to this PSP will be documented in a V/FCN. Before implementation, these changes require written approval from the affected persons or projects (e.g., Area Project Manager, Characterization Lead, QA) before the changes can be implemented (electronic mail is acceptable). Changes to the PSP will also be noted on the applicable FALs. QA must receive the completed V/FCN, with signatures of the Area Project Manager, Characterization Lead, and the QA Representative, along with the Field Sampling Lead and Analytical Contact, as necessary, within seven working days of granting approval.

4.4 PROJECT-SPECIFIC PROCEDURES, MANUALS AND DOCUMENTS

Work performed under this PSP will be conducted in accordance with the following procedures and documents:

- A9PI Predesign Work Plan
- PSP for A9PI Precertification Physical Sampling
- Sitewide Excavation Plan (SEP)
- Sitewide CERCLA Quality Assurance Project Plan (SCQ)
- ADM-02, Field Project Prerequisites
- EQT-06, Geoprobe® Model 5400 - Operation and Maintenance
- SMPL-01, Solids Sampling
- SMPL-21, Collection of Field Quality Control Samples
- S.P. 766-S-1000, Shipping Samples to Offsite Laboratories.

5.0 HEALTH AND SAFETY

Technicians will conform to precautionary surveys performed by personnel representing the Utility Engineer, Industrial Hygiene, and Radiological Control as applicable. All work performed on this project will be performed in accordance to applicable Environmental Monitoring project procedures, RM-0020 (Radiological Control Requirements Manual), RM-0021 (Safety Performance Requirements Manual), Fluor Fernald work permit, Radiological Work Permit (RWP), and other applicable permits. Each technician must concur with all safety permits applicable to performance of their assigned duties, and a safety briefing will be conducted prior to the initiation of field activities.

All emergencies shall be reported immediately to the site communication center at 648-6511 or contact "control" on the radio.

Health and safety considerations specific to A9PI include steep terrain in the unplowed areas and uneven footing where plowed. In addition, the suspended power lines running across this field pose a hazard for the Geoprobe®. While no boring locations are located beneath these lines, appropriate precautions should be taken when crossing beneath them. Field Technicians and their supervisor should walk down the area prior to sampling. Appropriate safety precautions should be taken by following applicable Safety Performance Requirements in RM-0021 and Fluor Fernald work permits.

6.0 DISPOSITION OF WASTES

During sampling activities, field personnel may generate small amounts of soil, water, and contact waste. Excess soil generated during sample collection will be replaced in the borehole. Contact waste generation will be minimized by limiting contact with sample media, and by only using disposable materials that are necessary. Contact waste will be bagged and brought back to site for disposal in an uncontrolled area dumpster. Generation of decontamination waters will be minimized in the field. Decontamination water that is generated will be contained in a polypropylene tank and returned to site for disposal. When equipment is decontaminated on-site, this will take place at a facility that discharges to the Advanced Wastewater Treatment Facility, either directly or indirectly, through the storm water collection system.

Following analysis, remaining soil will be returned to A9PI and spread at the point of origin (i.e., sampling locations), if possible. If access restrictions prevent this, the WAO contact should be consulted for disposition options. WAO should also be consulted in the event that additional significant waste volumes are generated.

7.0 DATA MANAGEMENT

A data management process will be implemented so information collected during the investigation will be properly managed following completion of the field activities. As specified in Section 5.1 of the SCQ, daily activities will be recorded on the FAL, with sufficient detail to be able to reconstruct a particular event. Sample Collection Logs will be completed according to procedure ADM-02, Field Prerequisites. Field records and real-time data files should include the PSP number for project records management.

Electronically recorded data from the Global Positioning System (GPS) will be downloaded to disks or to the Local Area Network (LAN) using the ethernet connection. Field documentation, such as the FAL, the Sample Collection Log, and the Sample Request/Sample Analysis Chain of Custody Log will undergo an internal QA/QC review by the field team members. Copies will then be generated and delivered to the Data Management Contact, who will perform an evaluation of the data and create the appropriate links between the electronically recorded data and the paper-generated data. The paper-generated data will be sent to data entry personnel for input into the Oracle System. Field logs may be completed in the field and maintained in loose-leaf form with each page uniquely identified. All field packages will be validated by the QA validation team.

The Laboratory Contact will report all analytical data from on-site and off-site laboratories in preliminary form to the Characterization Lead as soon as the data are available in the FACTS database. The first laboratory release will be forwarded to the data validation contact to perform the required ASL B validation. After validation, qualified data will be entered into the SED. All final results from this sampling effort will be pulled from the SED and reported to the Characterization Lead in the final data report format.

APPENDIX A

DATA QUALITY OBJECTIVES SL-048, REV. 5

2928

Control Number _____

Fernald Environmental Management Project

Data Quality Objectives

Title: Delineating the Extent of Constituents of Concern During Remediation Sampling

Number: SL-048

Revision: 5

Effective Date: February 26, 1999

Contact Name: Eric Kroger

Approval: (signature on file) Date: 2/25/99
James E. Chambers
DQO Coordinator

Approval: (signature on file) Date: 2/26/99
J.D. Chiou
SCEP Project Director

Rev. #	0	1	2	3	4	5	6
Effective Date:	9/19/97	10/3/97	4/15/98	6/17/98	7/14/98	2/26/99	

DATA QUALITY OBJECTIVES
Delineating the Extent of Constituents of Concern During Remediation Sampling

Members of Data Quality Objectives (DQO) Scoping Team

The members of the DQO team include a project lead, a project engineer, a field lead, a statistician, a lead chemist, a sampling supervisor, and a data management lead.

Conceptual Model of the Site

Media is considered contaminated if the concentration of a constituent of concern (COC) exceeds the final remediation levels (FRLs). The extent of specific media contamination was estimated and published in the Operable Unit 5 Feasibility Study (FS). These estimates were based on kriging analysis of available data for media collected during the Remedial Investigation (RI) effort and other FEMP environmental characterization studies. Maps outlining contaminated media boundaries were generated for the Operable Unit 5 FS by overlaying the results of the kriging analysis data with isoconcentration maps of the other constituents of concern (COCs), as presented in the Operable Unit 5 RI report, and further modified by spatial analysis of maps reflecting the most current media characterization data. A sequential remediation plan has been presented that subdivides the FEMP into seven construction areas. During the course of remediation, areas of specific media may require additional characterization so remediation can be carried out as thoroughly and efficiently as possible. As a result, additional sampling may be necessary to accurately delineate a volume of specific media as exceeding a target level, such as the FRL or the Waste Attainment Criterion (WAC). Each individual Project-Specific Plan (PSP) will identify and describe the particular media to be sampled. This DQO covers all physical sampling activities associated with Pre-design Investigations, precertification sampling, WAC attainment sampling or regulatory monitoring that is required during site remediation.

1.0 Statement of Problem

If the extent (depth and/or area) of the media COC contamination is unknown, then it must be defined with respect to the appropriate target level (FRL, WAC, or other specified media concentration).

2.0 Identify the Decision

Delineate the horizontal and/or vertical extent of media COC contamination in an area with respect to the appropriate target level.

3.0 Inputs That Affect the Decision

Informational Inputs - Historical data, process history knowledge, the modeled extent of COC contamination, and the origins of contamination will be required to

establish a sampling plan to delineate the extent of COC contamination. The desired precision of the delineation must be weighed against the cost of collecting and analyzing additional samples in order to determine the optimal sampling density. The project-specific plan will identify the optimal sampling density.

Action Levels - COCs must be delineated with respect to a specific action level, such as FRLs and On-Site Disposal Facility (OSDF) WAC concentrations. Specific media FRLs are established in the OU2 and OU5 RODs, and the WAC concentrations are published in the OU5 ROD. Media COCs may also require delineation with respect to other action levels that act as remediation drivers, such as Benchmark Toxicity Values (BTVs).

4.0 The Boundaries of the Situation

Temporal Boundaries - Sampling must be completed within a time frame sufficient to meet the remediation schedule. Time frames must allow for the scheduling of sampling and analytical activities, the collection of samples, analysis of samples and the processing of analytical data when received.

Scale of Decision Making - The decision made based upon the data collected in this investigation will be the extent of COC contamination at or above the appropriate action level. This delineation will result in media contaminant concentration information being incorporated into engineering design, and the attainment of established remediation goals.

Parameters of Interest - The parameters of interest are the COCs that have been determined to require additional delineation before remediation design can be finalized with the optimal degree of accuracy.

5.0 Decision Rule

If existing data provide an unacceptable level of uncertainty in the COC delineation model, then additional sampling will take place to decrease the model uncertainty. When deciding what additional data is needed, the costs of additional sampling and analysis must be weighed against the benefit of reduced uncertainty in the delineation model, which will eventually be used for assigning excavation, or for other purposes.

6.0 Limits on Decision Errors

In order to be useful, data must be collected with sufficient areal and depth coverage, and at sufficient density to ensure an accurate delineation of COC concentrations. Analytical sensitivity and reproducibility must be sufficient to differentiate the COC concentrations below their respective target levels.

Types of Decision Errors and Consequences

Decision Error 1 - This decision error occurs when the decision maker determines that the extent of media contaminated with COCs above action levels is not as extensive as it actually is. This error can result in a remediation design that fails to incorporate media contaminated with COC(s) above the action level(s). This could result in the re-mobilization of excavation equipment and delays in the remediation schedule. Also, this could result in media contaminated above action levels remaining after remediation is considered complete, posing a potential threat to human health and the environment.

Decision Error 2 - This decision error occurs when the decision maker determines that the extent of media contaminated above COC action levels is more extensive than it actually is. This error could result in more excavation than necessary, and this excess volume of materials being transferred to the OSDF, or an off-site disposal facility if contamination levels exceed the OSDF WAC.

True State of Nature for the Decision Errors - The true state of nature for Decision Error 1 is that the maximum extent of contamination above the FRL is more extensive than was determined. The true state of nature for Decision Error 2 is that the maximum extent of contamination above the FRL is not as extensive as was determined. Decision Error 1 is the more severe error.

7.0 Optimizing Design for Useable Data

7.1 Sample Collection

A sampling and analytical testing program will delineate the extent of COC contamination in a given area with respect to the action level of interest. Existing data, process knowledge, modeled concentration data, and the origins of contamination will be considered when determining the lateral and vertical extent of sample collection. The cost of collecting and analyzing additional samples will be weighed against the benefit of reduced uncertainty in the delineation model. This will determine the sampling density. Individual PSPs will identify the locations and depths to be sampled, the sampling density necessary to obtain the desired accuracy of the delineation, and if samples will be analyzed by the on-site or off-site laboratory. The PSP will also identify the sampling increments to be selectively analyzed for concentrations of the COC(s) of interest, along with field work requirements. Analytical requirements will be listed in the PSP. The chosen analytical methodologies are able to achieve a detection limit capable of resolving the COC action level. Sampling of groundwater monitoring wells may require different purge requirements than those stated in the SCQ (i.e., dry well definitions or small purge volumes). In order to accommodate sampling of wells that go dry prior to completing the purge of the necessary well volume, attempts to sample the

monitoring wells will be made 24 hours after purging the well dry. If, after the 24 hour period, the well does not yield the required volume, the analytes will be collected in the order stated in the applicable PSP until the well goes dry. Any remaining analytes will not be collected. In some instances, after the 24 hour wait the well may not yield any water. For these cases, the well will be considered dry and will not be sampled.

7.2 COC Delineation

The media COC delineation will use all data collected under the PSP, and if deemed appropriate by the Project Lead, may also include existing data obtained from physical samples, and if applicable, information obtained through real-time screening. The delineation may be accomplished through modeling (e.g. kriging) of the COC concentration data with a confidence limit specific to project needs that will reduce the potential for Decision Error 1. A very conservative approach to delineation may also be utilized where the boundaries of the contaminated media are extended to the first known vertical and horizontal sample locations that reveal concentrations below the desired action level.

7.3 QC Considerations

Laboratory work will follow the requirements specified in the SCQ. If analysis is to be carried out by an off-site laboratory, it will be a Fluor Daniel Fernald approved full service laboratory. Laboratory quality control measures include a media prep blank, a laboratory control sample (LCS), matrix duplicates and matrix spike. Typical Field QC samples are not required for ASL B analysis. However the PSPs may specify appropriate field QC samples for the media type with respect to the ASL in accordance with the SCQ, such as field blanks, trip blanks, and container blanks. All field QC samples will be analyzed at the associated field sample ASL. Data will be validated per project requirements, which must meet the requirements specified in the SCQ. Project-specific validation requirements will be listed in the PSP.

Per the Sitewide Excavation Plan, the following ASL and data validation requirements apply to all **soil and soil field QC samples** collected in association with this DQO:

- If samples are analyzed for Pre-design Investigations and/or Precertification, 100% of the data will be analyzed per ASL B requirements. For each laboratory used for a project, 90% of the data will require only a Certificate of Analysis, the other 10% will require the Certificate of Analysis and all associated QA/QC results, and will be validated to ASL B. Per Appendix H of the SEP, the minimum detection level (MDL) for these analyses will be established at approximately 10% of the action level (the action level for precertification is the

FRL; the action level for pre-design investigations can be several different action levels, including the FRL, the WAC, RCRA levels, ALARA levels, etc.). If this MDL is different from the SCQ-specified MDL, the ASL will default to ASL E, though other analytical requirements will remain as specified for ASL B.

- If samples are analyzed for WAC Attainment and/or RCRA Characteristic Areas Delineation, 100% of the data will be analyzed and reported to ASL B with 10% validated. The ASL B package will include a Certificate of Analysis along with all associated QA/QC results. Total uranium analyses using a higher detection limit than is required for ASL B (10 mg/kg) may be appropriate for WAC attainment purposes since the WAC limit for total uranium is 1,030 mg/kg. In this case, an ASL E designation will apply to the analysis and reporting to be performed under the following conditions:

    - all of the ASL B laboratory QA/QC methods and reporting criteria will apply with the exception of the total uranium detection limit

    - the detection limit will be ≤10% of the WAC limit (e.g., ≤103 mg/kg for total uranium).

- If delineation data are also to be used for certification, the data must meet the data quality objectives specified in the Certification DQO (SL-043).

- Validation will include field validation of field packages for ASL B or ASL D data.

All data will undergo an evaluation by the Project Team, including a comparison for consistency with historical data. Deviations from QC considerations resulting from evaluating inputs to the decision from Section 3, must be justified in the PSP such that the objectives of the decision rule in Section 5 are met.

7.4 Independent Assessment

Independent assessment shall be performed by the FEMP QA organization by conducting surveillances. Surveillances will be planned and documented in accordance with Section 12.3 of the SCQ.

7.5 Data Management

Upon receipt from the laboratory, all results will be entered into the SED as qualified data using standard data entry protocol. The required ASL B, D or E data will undergo analytical validation by the FEMP validation team, as required (see Section 7.3). The Project Manager will be responsible to determine data usability as it pertains to supporting the DQO decision of determining delineation of media

COC's.

7.6 Applicable Procedures

Sample collection will be described in the PSP with a listing of applicable procedures. Typical related plans and procedures are the following:

- Sitewide Excavation Plan (SEP)
- Sitewide CERCLA Quality Assurance Project Plan (SCQ).
- SMPL-01, *Solids Sampling*
- SMPL-02, *Liquids and Sludge Sampling*
- SMPL-21, *Collection of Field Quality Control Samples*
- EQT-06, *Geoprobe® Model 5400 Operation and Maintenance*
- EQT-23, *Operation of High Purity Germanium Detectors*
- EQT-30, *Operation of Radiation Tracking Vehicle Sodium Iodide Detection System*

Data Quality Objectives
Delineating the Extent of Constituents of Concern During Remediation Sampling

1A. Task/Description: Delineating the extent of contamination above the FRLs

1.B. Project Phase: (Put an X in the appropriate selection.)

RI ☐ FS ☐ RD ☒ RA ☐ R,A ☐ OTHER ☐

1.C. DQO No.: SL-048, Rev. 5 DQO Reference No.:_____

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2. Media Characterization: (Put an X in the appropriate selection.)

Air ☐ Biological ☐ Groundwater ☒ Sediment ☒ Soil ☒

Waste ☒ Wastewater ☐ Surface water ☐ Other (specify) _____

---

3. Data Use with Analytical Support Level (A-E): (Put an X in the appropriate Analytical Support Level selection(s) beside each applicable Data Use.)

Site Characterization A☐ B☒ C☐ D☒ E☒	Risk Assessment A☐ B☐ C☐ D☐ E☐
Evaluation of Alternatives A☐ B☐ C☐ D☐ E☐	Engineering Design A☐ B☒ C☐ D☒ E☒
Monitoring during remediation A☒ B☒ C☐ D☒ E☒	Other A☐ B☐ C☐ D☐ E☐

4.A. Drivers: Remedial Action Work Plans, Applicable or Relevant and Appropriate Requirements (ARARs) and the OU2 and/or OU5 Record of Decision (ROD).

4.B. Objective: Delineate the extent of media contaminated with a COC (or COCs) with respect to the action level(s) of interest.

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5. Site Information (Description):

6.A. Data Types with appropriate Analytical Support Level Equipment Selection and SCQ Reference: (Place an "X" to the right of the appropriate box or boxes selecting the type of analysis or analyses required. Then select the type of equipment to perform the analysis if appropriate. Please include a reference to the SCQ Section.)

1. pH	[X] *	2. Uranium	[X] *	3. BTX	[ ]
Temperature	[X] *	Full Radiological	[X] *	TPH	[ ]
Specific Conductance	[X] *	Metals	[X] *	Oil/Grease	[ ]
Dissolved Oxygen	[X] *	Cyanide	[ ]		
Technetium-99	[X] *	Silica	[ ]		

4. Cations	[ ]	5. VOA	[X] *	6. Other (specify)
Anions	[ ]	BNA	[X] *	
TOC	[ ]	Pesticides	[X] *	
TCLP	[X] *	PCB	[X] *	
CEC	[ ]	COD	[ ]	

*If constituent is identified for delineation in the individual PSP.

6.B. Equipment Selection and SCQ Reference:

Equipment Selection		Refer to SCQ Section	
ASL A		SCQ Section:	
ASL B	X	SCQ Section:	App. G Tables G-1&G-3
ASL C		SCQ Section:	
ASL D	X	SCQ Section:	App. G Tables G-1&G-3
ASL E	X (See sect. 7.3, pg. 6)	SCQ Section:	App. G Tables G-1&G-3

7.A. Sampling Methods: (Put an X in the appropriate selection.)

Biased [X] Composite [ ] Environmental [X] Grab [X] Grid [X]

Intrusive [X] Non-Intrusive [ ] Phased [ ] Source [ ]

DQO Number: SL-048, Rev. 5

7.B. Sample Work Plan Reference: This DQO is being written prior to the PSPs.

Background samples: OU5 RI

7.C. Sample Collection Reference:

Sample Collection Reference: SMPL-01, SMPL-02, EQT-06

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8. Quality Control Samples: (Place an "X" in the appropriate selection box.)

8.A. Field Quality Control Samples:

Trip Blanks	[X] *	Container Blanks	[X] ++
Field Blanks	[X] +	Duplicate Samples	[X] ***
Equipment Rinsate Samples	[X] ***	Split Samples	[X] **
Preservative Blanks	[ ]	Performance Evaluation Samples	[ ]
Other (specify)			

* For volatile organics only
** Split samples will be collected where required by EPA or OEPA.
*** If specified in PSP.
\+ Collected at the discretion of the Project Manager (if warranted by field conditions)
++ One per Area and Phase Area per container type (i.e. stainless steel core liner/plastic core liner/Geoprobe tube).

8.B. Laboratory Quality Control Samples:

Method Blank	[X]	Matrix Duplicate/Replicate	[X]
Matrix Spike	[X]	Surrogate Spikes	[ ]
Tracer Spike	[ ]		

Other (specify) Per SCQ

9. Other: Please provide any other germane information that may impact the data quality or gathering of this particular objective, task or data use.

APPENDIX B

A9PI PREDESIGN INVESTIGATION SOIL SAMPLES

APPENDIX B
A9PI PREDESIGN INVESTIGATION SOIL SAMPLES

2928

Location ID	Depth	Sample ID	Northing	Easting	Analysis
10	0"-6"	A9P1-10-1-RM	482423	1352008	TAL A
	6"-12"	A9P1-10-2-RM			TAL A
	12"-18"	A9P1-10-3-RM			TAL A
	18"-24"	A9P1-10-4-RM			TAL A
	24"-30"	A9P1-10-5-RM			TAL A
	30"-36"	A9P1-10-6-RM			TAL A
11	0"-6"	A9P1-11-1-RM	481617	1351869	TAL A
	6"-12"	A9P1-11-2-RM			TAL A
	12"-18"	A9P1-11-3-RM			TAL A
	18"-24"	A9P1-11-4-RM			TAL A
	24"-30"	A9P1-11-5-RM			TAL A
	30"-36"	A9P1-11-6-RM			TAL A
12	0"-6"	A9P1-12-1-RM	481948	1352032	TAL A
	6"-12"	A9P1-12-2-RM			TAL A
	12"-18"	A9P1-12-3-RM			TAL A
	18"-24"	A9P1-12-4-RM			TAL A
	24"-30"	A9P1-12-5-RM			TAL A
	30"-36"	A9P1-12-6-RM			TAL A
12 (duplicate)	0"-6"	A9P1-12-1-RM-D	481948	1352032	TAL A
	6"-12"	A9P1-12-2-RM-D			TAL A
	12"-18"	A9P1-12-3-RM-D			TAL A
	18"-24"	A9P1-12-4-RM-D			TAL A
	24"-30"	A9P1-12-5-RM-D			TAL A
	30"-36"	A9P1-12-6-RM-D			TAL A
12 (split)	0"-6"	A9P1-12-1-RM-S	481948	1352032	TAL A
	6"-12"	A9P1-12-2-RM-S			TAL A
	12"-18"	A9P1-12-3-RM-S			TAL A
	18"-24"	A9P1-12-4-RM-S			TAL A
	24"-30"	A9P1-12-5-RM-S			TAL A
	30"-36"	A9P1-12-6-RM-S			TAL A
13	0"-6"	A9P1-13-1-RM	481928	1351875	TAL A
	6"-12"	A9P1-13-2-RM			TAL A
	12"-18"	A9P1-13-3-RM			TAL A
	18"-24"	A9P1-13-4-RM			TAL A
	24"-30"	A9P1-13-5-RM			TAL A
	30"-36"	A9P1-13-6-RM			TAL A

APPENDIX B
A9PI PREDESIGN INVESTIGATION SOIL SAMPLES

Location ID	Depth	Sample ID	Northing	Easting	Analysis
14	0"-6"	A9P1-14-1-RM	482260	1352136	TAL A
	6"-12"	A9P1-14-2-RM			TAL A
	12"-18"	A9P1-14-3-RM			TAL A
	18"-24"	A9P1-14-4-RM			TAL A
	24"-30"	A9P1-14-5-RM			TAL A
	30"-36"	A9P1-14-6-RM			TAL A
15	0"-6"	A9P1-15-1-RM	482457	1352195	TAL A
	6"-12"	A9P1-15-2-RM			TAL A
	12"-18"	A9P1-15-3-RM			TAL A
	18"-24"	A9P1-15-4-RM			TAL A
	24"-30"	A9P1-15-5-RM			TAL A
	30"-36"	A9P1-15-6-RM			TAL A
16	0"-6"	A9P1-16-1-RM	482659	1352226	TAL A
	6"-12"	A9P1-16-2-RM			TAL A
	12"-18"	A9P1-16-3-RM			TAL A
	18"-24"	A9P1-16-4-RM			TAL A
	24"-30"	A9P1-16-5-RM			TAL A
	30"-36"	A9P1-16-6-RM			TAL A
17	0"-6"	A9P1-17-1-RM	482860	1352235	TAL A
	6"-12"	A9P1-17-2-RM			TAL A
	12"-18"	A9P1-17-3-RM			TAL A
	18"-24"	A9P1-17-4-RM			TAL A
	24"-30"	A9P1-17-5-RM			TAL A
	30"-36"	A9P1-17-6-RM			TAL A
18	0"-6"	A9P1-18-1-RM	483051	1352195	TAL A
	6"-12"	A9P1-18-2-RM			TAL A
	12"-18"	A9P1-18-3-RM			TAL A
	18"-24"	A9P1-18-4-RM			TAL A
	24"-30"	A9P1-18-5-RM			TAL A
	30"-36"	A9P1-18-6-RM			TAL A
19	0"-6"	A9P1-19-1-RM	483202	1352071	TAL A
	6"-12"	A9P1-19-2-RM			TAL A
	12"-18"	A9P1-19-3-RM			TAL A
	18"-24"	A9P1-19-4-RM			TAL A
	24"-30"	A9P1-19-5-RM			TAL A
	30"-36"	A9P1-19-6-RM			TAL A

APPENDIX B
A9PI PREDESIGN INVESTIGATION SOIL SAMPLES

Location ID	Depth	Sample ID	Northing	Easting	Analysis
20	0"-6"	A9P1-20-1-RM	483319	1352136	TAL A
	6"-12"	A9P1-20-2-RM			TAL A
	12"-18"	A9P1-20-3-RM			TAL A
	18"-24"	A9P1-20-4-RM			TAL A
	24"-30"	A9P1-20-5-RM			TAL A
	30"-36"	A9P1-20-6-RM			TAL A
21	0"-6"	A9P1-21-1-RM	483310	1352269	TAL A
	6"-12"	A9P1-21-2-RM			TAL A
	12"-18"	A9P1-21-3-RM			TAL A
	18"-24"	A9P1-21-4-RM			TAL A
	24"-30"	A9P1-21-5-RM			TAL A
	30"-36"	A9P1-21-6-RM			TAL A
22	0"-6"	A9P1-22-1-RM	483177	1352765	TAL B
	6"-12"	A9P1-22-2-RM			TAL B
	12"-18"	A9P1-22-3-RM			TAL B
	18"-24"	A9P1-22-4-RM			TAL B
	24"-30"	A9P1-22-5-RM			TAL B
	30"-36"	A9P1-22-6-RM			TAL B
23	0"-6"	A9P1-23-1-RM	482890	1352655	TAL B
	6"-12"	A9P1-23-2-RM			TAL B
	12"-18"	A9P1-23-3-RM			TAL B
	18"-24"	A9P1-23-4-RM			TAL B
	24"-30"	A9P1-23-5-RM			TAL B
	30"-36"	A9P1-23-6-RM			TAL B
24	0"-6"	A9P1-24-1-RM	482401	1352584	TAL B
	6"-12"	A9P1-24-2-RM			TAL B
	12"-18"	A9P1-24-3-RM			TAL B
	18"-24"	A9P1-24-4-RM			TAL B
	24"-30"	A9P1-24-5-RM			TAL B
	30"-36"	A9P1-24-6-RM			TAL B
25	0"-6"	A9P1-25-1-RM	482007	1352545	TAL B
	6"-12"	A9P1-25-2-RM			TAL B
	12"-18"	A9P1-25-3-RM			TAL B
	18"-24"	A9P1-25-4-RM			TAL B
	24"-30"	A9P1-25-5-RM			TAL B
	30"-36"	A9P1-25-6-RM			TAL B

APPENDIX B
A9PI PREDESIGN INVESTIGATION SOIL SAMPLES

Location ID	Depth	Sample ID	Northing	Easting	Analysis
26	0"-6"	A9P1-26-1-RM	481745	1352564	TAL B
	6"-12"	A9P1-26-2-RM			TAL B
	12"-18"	A9P1-26-3-RM			TAL B
	18"-24"	A9P1-26-4-RM			TAL B
	24"-30"	A9P1-26-5-RM			TAL B
	30"-36"	A9P1-26-6-RM			TAL B
27	0"-6"	A9P1-27-1-RM	481391	1352541	TAL B
	6"-12"	A9P1-27-2-RM			TAL B
	12"-18"	A9P1-27-3-RM			TAL B
	18"-24"	A9P1-27-4-RM			TAL B
	24"-30"	A9P1-27-5-RM			TAL B
	30"-36"	A9P1-27-6-RM			TAL B
28	0"-6"	A9P1-28-1-RM	481041	1351883	TAL C
	6"-12"	A9P1-28-2-RM			TAL C
	12"-18"	A9P1-28-3-RM			TAL C
	18"-24"	A9P1-28-4-RM			TAL C
	24"-30"	A9P1-28-5-RM			TAL C
	30"-36"	A9P1-28-6-RM			TAL C
S1	0"-6"	A9P1-S1-RM	483590	1352152	TAL B
S2	0"-6"	A9P1-S2-RM	483823	1352300	TAL B
S3	0"-6"	A9P1-S3-RM	484171	1352531	TAL B
S4	0"-6"	A9P1-S4-RM	484512	1352820	TAL B

APPENDIX C

TARGET ANALYTE LISTS

APPENDIX C
TARGET ANALYTE LISTS
A9PI Predesign Investigation Physical Sampling
Project Number 21120-PSP-0001

TAL A9PI-PDI-A

Gamma Spectrometry	
ASL B	Total Uranium (FRL = 50 mg/kg)
ASL B	Thorium-228 (FRL = 1.5 pCi/g)
ASL B	Thorium-232 (FRL = 1.4 pCi/g)
ASL B	Radium-226 (FRL = 1.5 pCi/g)
ASL B	Radium-228 (FRL = 1.4 pCi/g)
SEP Approved Method	
ASL B	Arsenic (FRL = 9.6 mg/kg)
ASL B	Beryllium (FRL = 0.62 mg/kg)

TAL A9PI-PDI-B

Gamma Spectrometry	
ASL B	Total Uranium (FRL = 50 mg/kg)
ASL B	Thorium-228 (FRL = 1.5 pCi/g)
ASL B	Torium-232 (FRL = 1.4 pCi/g)
ASL B	Radium-226 (FRL = 1.5 pCi/g)
ASL B	Radium-228 (FRL = 1.4 pCi/g)
SEP Approved Method	
ASL B	Arsenic (FRL = 9.6 mg/kg)

TAL A9PI-PDI-C

Gamma Spectrometry	
ASL B	Total Uranium (FRL = 50 mg/kg)
ASL B	Thorium-228 (FRL = 1.5 pCi/g)
ASL B	Thorium-232 (FRL = 1.4 pCi/g)
ASL B	Radium-226 (FRL = 1.5 pCi/g)
ASL B	Radium-228 (FRL = 1.4 pCi/g)
SEP Approved Method	
ASL B	Arsenic (FRL = 9.6 mg/kg)
ASL B	Lead (FRL = 400 mg/kg)

TAL A9PI-PDI-D

Gamma Spectrometry	
ASL B	Total Uranium (FRL = 50 mg/kg)
ASL B	Thorium-228 (FRL = 1.5 pCi/g)
ASL B	Thorium-232 (FRL = 1.4 pCi/g)
ASL B	Radium-226 (FRL = 1.5 pCi/g)
ASL B	Radium-228 (FRL = 1.4 pCi/g)
SEP Approved Method	
ASL B	Arsenic (FRL = 9.6 mg/kg)
ASL B	Beryllium (FRL = 0.62 mg/kg)
ASL B	Lead (FRL = 400 mg/kg)

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